REPORT ON THE

CAWNPORE EXPERIMENTAL STATION

FOR THE RABI SEASON OF 1885-86.

ALLAHABAD:

NORTH-WESTERN PROVINCES AND OUDH GOVERNMENT PRESS.

1886.

REPORT ON THE

CAWNPORE EXPERIMENTAL STATION

FOR THE RABI SEASON OF 1885-86.

ALLAHABAD:

NORTH-WESTERN PROVINCES AND OUDH GOVERNMENT PRESS.

1886.

630
N8790u

8477

No. $\frac{A}{7218}$ OF 1886.

DEPARTMENT OF AGRICULTURE AND COMMERCE, N.-W. P. AND OUDH.

DATED CAWNPORE, THE 9TH DECEMBER, 1886.

FROM

DONALD SMEATON, ESQ., M.A., C.S.,
DIR., DEPT. OF AGRI. AND COMMERCE,
N.-W. PROVINCES AND OUDH,

TO

THE CHIEF SECRETARY TO GOVERNMENT,
N.-W. PROVINCES AND OUDH.

SIR,

I HAVE the honor to submit, for His Honor's orders, the report of operations in the Cawnpore experimental station during the rabi season of 1885-86.

The report has been written by Mir Muhammad Husain, Assistant Director, himself, as Superintendent of the operations. It is too long and detailed, and hence, in great measure, the delay in its submission. I have asked Mir Muhammad Husain to bring these reports in future into a much smaller compass, and, as far as possible, deal in detail only with operations and results that are new, referring very briefly to such confirmations of previous results as are likely to be useful. The tables of treatment and outturn will be curtailed and placed in an appendix. Henceforward I would recommend that this, the rabi season narrative, be incorporated in the annual report and not issued separately at all. The kharíf season narrative must, I imagine, continue to be separately issued, but its dimensions will also be considerably curtailed.

2. To glance at some of the principal results.

Among the permanent experiments, we find that after all ordinary farmyard manure is the cheapest and most efficient that the cultivators of the country can have. It never fails to ensure a good return : and it is always available. Saltpetre is shown to be an excellent fertilizer. Were there no salt excise, I verily believe that saltpetre would come to be extensively used, and with great advantage, by the people. The dread of the "*permit*" authorities is deep-seated, and it will be hard to rid the people of it. If by any means the simple manufacture of crude saltpetre could be allowed to spread, the way would be opened for introduction of this fertilizer. But there are, I admit, serious difficulties while the salt excise remaining an important source of public revenue.

The new experiment of manuring with the dung of cake-fed cattle has been a success. The cultivator would have better and stronger cattle by feeding them with cake, and would at the same time have better crops by using the manure than he now has. But the invariable question of cost intervenes and renders it very doubtful if the cultivator can ever really put in practice what the experiment teaches.

Another result, not a new one, is that the rotation of wheat with maize is, for both crops, probably the best. But the cultivator knows this as well as we do.

The results of green-soiling are only conformatory of previous experience. The Superintendent's conclusion in regard to deep and shallow ploughing in the absence of manure is deserving of attention.

The outcome of the watering experiment is conformatory of previous experience.

The Jethro Túll system of sowing is apparently good, but is scarcely likely to appear so to the cultivators, who will be prone to aver that it is a waste of good land. I do not think this experiment need be continued.

3. Looking now to what are called the temporary experiments, we find that lucerne, like clover in Europe, is a good preparation for cereals.

Linseed was a failure owing to destruction of the crop by an insect pest. Attention will be paid to developing the white variety which is so highly spoken of by experts in England.

The tobacco experiment was new. It is doubtful whether this experiment can serve any useful end. The people themselves do not care for a highly cured article : and it is pretty certain that no export trade in tobacco grown in North-Western India can ever spring up.

Ensilage shows really good and useful results. *Chari* or thickly-sown, early cut *jowar*, proves to be an excellent fodder for storage in the silo. At the age of 18 months it was as fresh and as palatable as new. The only thing is that, unluckily, the cultivator cannot generally afford to grow more *chari* than is necessary for one season : so that he never can have much to store.

4. The Watt and Duplex ploughs appear to be making some head. The cost of the former is against it. But it has been found possible to make an imitation Watt plough for little more than half the American price, and it is hoped that this may be useful.

A smaller Duplex plough, more portable than the original and much cheaper, is also being made and samples are being circulated.

The nearer we can approach the appearance and weight and cost of the country plough the more likely we are to induce cultivators to follow our teaching.

5. The distribution of seed has been on an extensive scale : and I believe that the measure will in time bear fruit in an improvement of the quality of the produce raised by the people. The fine white wheat is a favourite everywhere.

6. Mir Muhammad Husain has devoted himself with unremitting zeal and great intellegence to the experimental operations.

Ali Husain, the Overseer, has also been most industrious and useful.

I have the honor to be,

SIR,

Your most obedient servant,

DONALD SMEATON,

Director.

REPORT

ON THE

CAWNPORE EXPERIMENTAL STATION

FOR THE RABI SEASON OF 1885-86.

Character of the season.—The rainfall recorded during the season under review is shown in the following table :—

Month.	Rainfall in inches.			
	At the Station.		*In the City.*	
	In 1884-85.	In 1885-86.	In 1884-85.	In 1885-86.
September	9·30	2·20	8 70	1·57
October	6 10	...	6 50	·29
November	...	...	...	...
December	·10	0·90	·10	2·56
January	...	0·19	·11	·19
February	...	...	...	...
March	...	0·34	...	·34
April	...	...	...	...
Total ...	15·50	3·63	15·41	4·95

It ceased all of a sudden and very early this time. This as well as the dry westerly winds, which blew in those days, caused a rapid loss of the moisture from the soil, and necessitated the finishing and sowing of the fields within a very limited time.

The crops, up to the ripening time, looked most promising, but unfortunately strong, dry winds began to blow, just when the grain was in the dough state, which increased evaporation and deprived the grain of its nourishment at the very time when it needed most. The grain shrivelled and the yield generally was poor. The wheat commonly suffered throughout the provinces a great deal.

2. *Diseases.*—With the exception of some slight appearance of mildew, no disease or insect pest disturbed any of the rabi crops. Of the varieties of wheat tried at the station, the *kathya* and beardless proved to be more susceptible to mildew than the Muzaffarnagar white variety. The Muzaffarnagar wheat, grown with different kinds of fertilizers, remained very healthy, excepting one or two plots of the green-soiling, series where the plants were slightly attacked by the yellow fungus called *girwi*.

3. *Average yield per acre.*—There were about 25 acres under wheat of different descriptions. Of these 13·69 acres were under various experiments and 7·4 acres under ordinary cultivation, sown simply for seed.

Ten plots of 400 square yards each, under the influence of the best fertilizers, produced at an average as much as 33·6 bushels,* or 26 maunds* and 10 seers per acre—the average of 30 bushels per acre is considered a good yield in England—

*Standard bushel of wheat = 64 lb.
82 lb. = 1 maund.

While 10 plots which have received no manure for years, and are kept as standards to compare the result of good farming or of simple ploughing, watering, &c., gave an outturn of only 5·31 bushels.

The yield of the plots kept unmanured is getting lower and lower every year.

EXPERIMENTS.

4. The experiments may be classed—

I.—Permanent.

II.—Temporary.

These experiments are to determine—

(1) Whether wheat can be grown year after year by the aid of artificial manures.

(2) Whether to obtain a good crop rotation proves indispensable.

(3) For how long and to what amount without artificial means a soil remains capable of nourishing the plant-life and its growth.

(4) Which constituent in soil or in a manure is more essential for wheat, and needs to be provided artificially in the case of its absence.

(5) For how long the residue of a manure remains available for a cereal, especially wheat.

(6) Whether simply deep-ploughing and watering is enough for obtaining a good crop or an application of manure still required, and what the real effect of the different kinds of ploughing and of watering in the absence of a fertilizer is.

In order to confirm previous results most of the experiments are kept unchanged, and some of them are tried in duplicate and triplicate plots ; not only side by side, but at some distance, and in somewhat different soils.

5. The following are the permanent experiments, the area which they cover and the year when they were first started are noted below—

Experiment on the effect of—			*Area under experiment.*	*Year when started.*
A.—Different manures	...	...	4·94	1880.
B.—Green soiling	....	...	4·45	"
C.—Poughing	...	...	1·80	"
D.—Watering	...	...	·90	"
E.—Sowing	...	...	1·60	"
	Acres	...	13·69	

6. The following is a brief summary of the experiments conducted during the season under report :—

A. **Experiments on Manure.**—These may be classed into—

I.—Farmyard and artificial manure.

II.—Oil-cake used as manure.

III.—Miscellaneous.

I.—Experiment with farmyard and artificial manures. These are carried on in two series :—

(1) The standard series.

(2) The duplicate series.

These series consist of 26 plots—13 in each. In the standard series wheat is grown year after year. In the other series plots are cropped with wheat and maize alternately. All the treatments in every plot remain the same, *viz.* :—

Ploughing with Watt's—twice.

Ditto country—ditto.

Watering—three times.

Weeding—if necessary.

Manure as in the following table.

The result of the experiment is tabulated below :—

Table II.—Result of Standard Series.

		Comparison of outturn with the unmanured plot in the series.								*Comparison of cost and income with the ordinary kind of cultivation in vogue in the country.*							
1	2	3	4	5	6	7	8	9	10	11		12			13	14	15
Number of plots as per map of the farm.	Detail of special treatment with the rate of its cost.	Weight of unthreshed sheave.	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Increase or decrease over standard plot in the series.	Increase or decrease per acre.	*Actual outturn per acre.*		*Value of outturn.*			Gain or loss per acre in the cost against the cost of ordinary cultivat, ion assumed to be Rs. 30.	Gain or loss per acre in the value of outturn against ordinary kind of cultivation, assumed to be Rs. 38.	Net profit or loss against the assumed income of Rs 38* from ordinary cultivation.
										Grain.	Straw.	Grain at Re. 1 per 41 lb.	Straw at Re. 1 per 400 lb.	Total.			
	Quantity of manure applied per acre.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	Rs as.	Rs. as.	Rs. as.	Rs. a.	Rs. a.	Rs. a.
3	Cowdung, 180 maunds per acre, at Rs. 3-0 per 100 maunds.	644	127	264	67¾	48	208	+51½	+624	1,537	3,194	37 8	8 0	45 8	— 2 6	+ 7 8	+ 5 2
4	Cowdung, 180 maunds per acre, at Rs. 3 per 100 maunds, and bone dust, 360 lb, at 11 annas per 82 lb.	669	156	200	66½	78	128	+80½	+975	1,888	2,420	46 0	6 1	52 1	— 5 6	+14 1	+ 8 11
5	Cowdung, 180 maunds per acre, at Rs. 3 per 100 maunds, and gypsum, 240 lb per acre, at Re. 1-12-0 per 82 lb.	588	153½	219	67	70	143	+78	+944	1,857	2,650	45 5	6 10	51 15	— 7 8	+13 15	+ 6 7
7	Ashes of 180 maunds cowdung per acre at Rs. 3 per 100 maunds.	544	79½	178	68½	45	224	+4	+49	962	2,154	23 7	5 6	28 13	— 2 6	— 9 3	—11 9
13	Ashes of 180 maunds cowdung at Rs. 3 per 100 maunds, and saltpetre, 240 lb per acre, at Rs. 3-8-0 per 82 lb.	608	80	200	67½	40	250	+4½	+55	968	2,420	23 10	6 1	29 11	—12 10	— 8 5	—20 15
6	Sheep dung, 180 maunds per acre, at Rs. 3 per 100 maunds	576	125½	198	67 10/16	63	158	+50	+605	1,518	2,396	37 0	6 0	43 0	— 2 6	+ 5 0	+ 2 10
8	Sheep dung, 180 maunds, at Rs. 3 per 100 maunds, and bone dust, 360 lb per acre, at 11 annas per 82 lb.	594	117	170	67¾	69	145	+41½	+503	1,416	2,057	34 9	5 2	39 11	— 5 6	+ 1 11	— 3 11
10	Sheep dung, 180 maunds, at Rs. 3 per 100 maunds, and gypsum, 240 lb per acre, at Re. 1-12-0 per 82 lb	629	93¾	160	68	59	170	+18¼	+221	1,134	1,936	27 10	4 13	32 7	— 7 8	+ 5 9	— 1 15
12	*Poudrette*, 180 maunds per acre, at Rs. 4 per 100 maunds.	598	101½	162	68	63	158	+26	+315	1,228	1,960	29 15	4 14	34 13	— 7 3	— 3 3	—10 6
1	Saltpetre, 240 lb per acre, at Rs 3-8-0 per 82 lb.	639	141½	250	66½	57	177	+66	+799	1,712	3,025	41 12	7 9	49 5	— 7 4	+11 5	+ 4 1
2	Saltpetre, 240 lb per acre, at Rs. 3-8-0 per 82 lb and bone dust, 240 lb per acre, at 11 annas per 82 lb.	653	160	258	66	62	161	+84½	+1,023	1,936	3,122	47 4	7 13	55 1	— 10 4	+17 1	+ 6 13
9	Saltpetre, 240 lb per acre, at Rs. 3-8-0 per 82 lb and superphosphate, 240 lb per acre, at Rs. 4-8 per 112 lb.	646	90¾	162	68½	56	179	+15¼	+185	1,098	1,960	26 12	4 14	31 10	—19 4	—6 6	—25 10
11	No manure	613	75½	110	63¾	69	146	...	...	913	1,331	22 4	3 5	25 9	+ 3 0	—12 7	— 9 7

NOTE.—(1) Column 1 contains not serial numbers, but farm map numbers.
(2) The total of columns 4 and 5 would not agree with the entry of column 3, because though the sheaves were weighed after a fixed time, yet they were not equally dry at the time of weighment.
(3) Plus (+) indicates gain and minus (−) loss.
(4) The entries of column 9 is the difference of the outturn of unmanured plot and other plots in the series respectively.
(5) Extra cost of single or compound manure over Rs 3 cost of 100 maunds farmyard manure, (included in the cost of standard plot) is shown in column 13.
(6) In the calculations the fractions after seers, ounces, and annas have been left out; and in the case of its being more than half is taken as a whole number.
(7) Entries of column 14 are the difference of the total in column 12, and of Rs. 38, (the assumed income from an acre of wheat, raised by ordinary kind of cultivation,) *1,312 lb at 41 lb per rupee = Rs. 32; and 2,400 lb straw at 400 lb per rupee = Rs. 26.

Table III.—Result of Duplicate Series.

		Comparison of outturn with the unmanured plot in the series.								*Comparison of the cost and income with the ordinary kind of cultivation in vogue in the country*							
1	2	3	4	5	6	7	8	9	10	11		12			13	14	15
Number of plots as per map of the farm.	Detail of special treatment with the rate of its cost	Weight of unthreshed sheaves.	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Increase or decrease over standard plot in the series.	Increase or decrease per acre.	*Actual outturn per acre*		*Value of outturn.*			Gain or loss per acre in the cost against the cost of ordinary cultivation, assumed to be Rs 30.	Grain or loss per acre in the value of outturn against ordinary cultivation, assumed to be Rs. 38.	Net profit or loss against the assumed income of Rs. 38.
										Grain.	Straw.	Grain at Rs. 1 per 41 lb.	Straw at Rs 1 per 400 lb	Total			
	Quantity of manure applied per acre.	lb	lb.	lb.	lb.	lb.	lb	lb.	lb.	lb.	lb.	Rs. as.	Rs. as.	Rs. as	Rs. as	Rs as	Rs as
1	Cowdung, 180 maunds per acre, at Rs. 3 per 100 maunds.	580	167	311	68½	54	186	74½	902	2,02	3,703	49 5	9 7	58 12	—2 6	+20 12	+18 6
2	Cowdung, 180 maunds per acre, at Rs. 3 per 100 maunds, and bone dust 360 lb at 11 annas per 82 lb.	603	129	250	66½	52	194	37½	442	1,561	3,025	38 0	7 9	45 10	—5 6	+7 10	+2 4
3	Cowdung, 180 maunds per acre, at Rs. 3 per 100 maunds, and gypsum, 240 lb per acre, at Re 1-12-0 per 82 lb.	582	171	270	68½	63	158	79	950	2,069	3,267	50 7	8 3	58 10	—7 8	+20 10	+13 2
4	Ashes of 180 maunds cowdung per acre at Rs. 3 per 100 maunds.	394	128	256	68	50	200	36	430	1,549	3,098	37 12	7 12	45 8	—2 6	+7 8	+5 2
11	Ashes of 180 maunds cowdung at Rs 3 per 100 maunds, and saltpetre, 240 lb per acre, at Rs. 3-8-0 per 82 lb	570	130	242	68	54	186	38	454	1,573	2,928	38 6	7 5	45 11	—12 10	+7 11	—4 15
12	Sheep dung, 180 maunds per acre, at Rs 3 per 100 maunds.	645	164	305	67½	54	186	72	865	1,984	3,690	48 6	9 4	57 10	—2 6	+19 10	+17 4
8	Sheep dung, 180 maunds, at Rs 3 per 100 maunds, and bone dust, 360 lb per acre, at 11 annas per 82 lb.	579	153	250	68½	65	154	71½	853	1,972	3,025	48 2	7 9	55 10	—5 6	+17 11	+12 4
9	Sheep dung, 180 maunds, at Rs 3 per 100 maunds, and gypsum, 240 lb per acre, at Rs. 1-12 0 per 82 lb	576	130	252	68	51	194	38	454	1,573	3,049	38 6	7 10	46 0	—7 8	+8 0	+0 8
13	*Poudrette*, 180 maunds per acre, at Rs. 4 per 100 maunds.	584	149	254	68	59	170	57	684	1,8[illegible]3	3,073	44 0	7 11	51 11	—4 3	+13 11	+9 8
5	Saltpetre, 240 lb per acre, at Rs. 3-8-0 per 82 lb.	520	116	178	63½	65	154	24	285	1,404	2,154	34 4	5 6	39 10	—7 4	+1 10	—5 10
6	Saltpetre, 240 lb per acre, at Rs 3-8-0 per 82 lb, and bone dust, 240 lb per acre, at 11 annas per 82 lb.	635	173	326	68½	53	188	81	974	2,093	3 945	51 1	9 14	60 15	—10 4	+22 15	+12 11
7	Saltpetre, 240 lb per acre, at Rs. 3-8-0 per 82 lb, and superphosphate 240 lb per acre, at Rs. 4-8-0 per 112 lb.	492	116	170	67½	68	146	34	285	1,404	2,057	34 4	5 2	39 6	—16 14	+1 6	—15 8
10	No manure.	492	92½	242	35½	38	262	...	...	1,119	2,928	27 5	7 5	34 10	+3 0	—3 6	—0 6

7. In comparing the above and the following results, the undernoted points must be borne in mind :—

(1) The results must not be considered unchangeable, as they are subject to various circumstances.

(2) Too close comparison must not be made, as it is impossible to keep any two fields under the same conditions throughout a season.

(3) The rates of manures are taken from the farm report for the year 1880-81, but they depend on various circumstances, *i.e.*, under some chance the cost of a manure could be reduced to almost nothing; but, on the other hand, it is possible that this item under other circumstances would become ten times higher than what is actually paid at Cawnpore.

(4) By reducing all the results to one scale, *viz.*, in money value, there remains nothing complicated and misleading in weighing the real value of an operation.

8. *Detail of the results shown in Tables II and III.*—One very important lesson can be learnt from the results of the foregoing tables, *viz.*, for good and high farming rotation is indispensable.

Table II shows the fact that, although a fair crop of wheat can be got year after year from a land with the aid of artificial fertilizers, but it cannot keep its fertility up to that point like the land kept under the rotation of crops. The fact is quite visible by columns 14 and 15 of Tables II and III.

Five out of thirteen plots of the standard series did not cover even their expenses, and it was only in one case that the net profit of Rs. 8 (the profit over ordinary cultivation) was attained ; while in the duplicate series treated just the same way, there was profit in nine out of the thirteen plots, and the net gain in five cases exceded the profit under ordinary cultivation.

This fact is further confirmed by comparing the results of the series in question for the last five years in the following table :—

Table IV.—*Showing the comparative results of the standard and duplicate series for the last four years.*

Manures.		Grain per acre.				Straw per acre.			
		1882-83.	1883-84.	1884-85	1885 86.	1882-83.	1883-84.	1884-85.	1885-86.
		lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Cowdung ...	Standard ..	1,718	1,427	902	1,537	3,126	2,329	1,319	3,194
	Duplicate,	1,623	3,031	1,166	2,014	2,958	4,988	1,670	3,763
Cowdung and bone dust.	Standard ..	1,584	1,343	1,016	1,888	2,684	2,456	1 427	2,420
	Duplicate,	1,400	2,873	1,516	1,554	2,412	5,112	1,742	3,025
Cowdung and gypsum.	Standard ..	1,740	1,364	886	1,857	3,270	2,408	1,464	2,650
	Duplicate,	1,886	3,004	1,396	2,063	2,778	4,695	1,718	3,267
Ashes of cowdung,	Standard...	1,383	1,134	704	961	2,412	2,311	1,222	2,154
	Duplicate,	1,417	2,323	1,089	1,549	2,436	2,817	1,488	3,098
Saltpetre ..	Standard...	1,978	1,355	1,333	1,712	3,636	2,411	2,412	3,025
	Duplicate,	2,181	2,707	1,417	1,397	3,406	5,642	2,486	2,154
Saltpetre and bone dust.	Standard ..	1,945	1,252	1,170	1,936	3,690	2,668	1,621	3,122
	Duplicate,	2,056	2 901	1,624	2,093	3,834	5,726	2,565	3 945
Saltpetre and bone superphosphate.	Standard...	...	1,984	1,509	1,098	...	3,817	2,081	1,960
	Duplicate,	...	3,061	2,007	1,404	...	5,862	2,795	2,057
Sheep dung and bone dust.	Standard...	...	1,143	826	1,416	...	1,888	1,258	2,057
	Duplicate,	...	2,391	1,615	1,966	...	4,435	1,986	3,025
Sheep dung and gypsum.	Standard ..	...	1,337	756	1,146	...	2,323	1,391	1,936
	Duplicate,	...	2,601	1,276	1,573	...	4,471	1,900	3,049
No manure ...	Standard ..	1,065	1,031	635	913	1,764	2,093	1,004	1,331
	Duplicate,	999	2,280	1,025	1,119	1,764	3,672	1,452	2,928
Ashes of dung and saltpetre.	Standard ..	...	...	1,149	968	...	...	1,670	2,420
	Duplicate,	...	...	1,586	1,573	...	...	2 057	2,928
Sheep dung ...	Standard...	...	...	889	1,518	...	...	1,500	2,396
	Duplicate,	...	...	1,448	1,984	...	...	2,153	3,690
Poudrette ...	Standard ..	...	...	1,074	1,228	...	...	1,307	1,960
	Duplicate,	...	...	1,492	1,802	...	...	1,730	3,073

In the majority of cases the plots alternated with wheat and maize have given a better yield than the plots in which wheat was sown successively.

By the light of the theory which on the farm has now proved true beyond doubt, we can safely affirm that, for good cropping, rotation is as necessary as the manure is.

9. The effect of each manure in question may briefly be described thus :—

Cowdung alone and combined with other substances.—By comparing the results it will be seen that cowdung is the most handy and cheap manure for a common káshtkár. It has *always* proved to be so.

By the application of dung alone the percentage of grain over straw was not very good, but the weight per bushel very fair. Against unmanured plots in the series it has given nearly double yield.

Dung applied with bone dust gave still better yield, and it has shown the same result during the last three seasons. So the dung with gypsum in many instances (though not steadily) has proved to be better than dung alone. In both cases the percentage of grain over straw has been very good, being 78 and 70 respectively.

The ashes of dung have never proved to be a good fertilizer—at all events never so much as the unburnt dung. The percentage of grain over straw in this case is worst of all ; from the weight per bushel it seems that there was no defect in the quality of the grain.

Even with saltpetre the ashes do not seem to have ever shown any remarkable effect. The last experiment has existed for the last two seasons only.

Sheep dung.—The sheep dung singly and with other fertilizers has again proved not so good as the cowdung. There can be no other reasons for this but those stated in the last report, para. 21, *viz.* :—

(1) The sheep on the farm are kept entirely on grass, while the cattle in some months are fed on grain.

(2) Folding sheep on a field provides better manure for it than putting their rotten excrement.

As promised in para. 22 of last year's report, the experiment of folding sheep was tried. The plot on which sheep were folded yielded 19·7 maunds per acre against 18·5 maunds as produced in the plot of this series which was manured at the rate 180 maunds of rotten sheep dung per acre. The result, however, cannot at present be pronounced to be decisive.

Poudrette.—To the great astonishment this manure has remained behind the cattle dung : no cause for this can at present be assigned. From an economcial point of view, this manure gave the worst result. But it must be noted here that, under circumstances, on the farm we have to pay a very high price for it, while to the owners of fields near the village site it does not cost even as much as the farmyard manure.

Saltpetre alone and with other fertilizers.—This over-successful fertilizer alone and with bone dust has always left some margin of net profit after recovering its own cost, but the question is whether the use of the same can possibly be made by the cultivator in this country. Under the present circumstances, being a purchased manure, it does not prove very tempting to a common káshtkár.

The yield with saltpetre combined with superphosphate has been very poor. The reason for this too, like *poudrette*, is not apparent. Economically, it has shown the greatest loss, *i.e.*, of Rs. 25-10-0 per acre ; more than 2½ times against the unmanured plot.

10. *Percentage of grain over straw.*—It is worth noticing that the ashes of dung in both, and the saltpetre in two out of three farms being applied to, gave a less percentage of grain over straw.

This point, that the saltpetre made the stock grow more luxuriantly, and produced proportionately less grain, had been noticed in last year's report (*vide* para. 30) But whether this is a fact is yet to be confirmed.

With simple cowdung also the percentage of straw was much too large, but with sheep dung it was very fair, being 48 and 63 respectively.

The plots with bone dust and gypsum combined with cowdung, sheep dung and saltpetre have produced grain in larger proportion.

11. *Extra cost of manure.*—From column 13 of Table I. it is seen that the most expensive manures are those applied to plots Nos. 4, 5, 13, 8, 10, 12, 1, 2 and 9. Of these Nos. 4, 5, 1 and 2 recovered their expenses and left some net profit. The largest profit was left by the cowdung and bone dust.

12. *Duplicate series.*—The plots of this series, as a rule, have comparatively given much larger yields than the plots of the standard series. The greatest profit seems with simple cowdung and sheep dung.

Poudrette—In this case has given a fair result, and so the saltpetre and bone dust.

The greatest loss in this instance also is in the case of saltpetre and superphosphate applied combined.

13. *II.*—The following is one of the two new manure experiments started from this season :—

Determination of the effect of different oil-cakes, and of the cake-fed dung.

In a concentrated form this experiment, too, will be kept permanent.

For this seven series each of seven plots and each plot of 400 square yards were made.

The kinds of cakes experimented upon were :—

(A.) Mustard cake.
(B.) Cotton seed cake.
(C.) Linseed do.
(D.) Til do.
(E.) Safflower do.
(F.) Poppy do.
(G.) Castor do.

Of the seven plots in each series, one was kept unmanured, and in three the cake was applied at the rate of 5, 10 and 20 maunds per acre respectively, and in the remaining three plots the dung of the cattle fed upon the same cake was put at the rate of 50, 100 and 200 maunds per acre.

The other treatment was—

(1) Ploughing with Watt's twice.
Ditto country do.
(2) Watering three times.

The result is shown in the following table :—

Table No. V.

		Comparison of outturn with the unmanured plot in the series.								Comparison of cost and income with the ordinary kind of cultivation in vogue in the country.							
1	2	3	4	5	6	7	8	9	10	11		12			13	14	15
Number of plots as per map of the Farm.	Detail of special treatment with the rate of its cost.	Weight of unthreshed sheaves	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Increase or decrease over standard plot in the series.	Increase or decrease per acre.	Actual outturn per acre		Value of outturn.			Gain or loss per acre in the cost against the cost of ordinary cultivation, assumed to be Rs. 30.	Gain or loss per acre in the value of outturn against ordinary kind of cultivation, assumed to be Rs. 38	Net profit or loss against the assumed income of Rs. 38.
										Grain.	Straw.	Grain at Rs. 2 per 82 lb.	Straw at Rs. 1 per 400 lb.	Total.			
	Quantity of manure applied per acre	lb.	lb.	lb	lb.	lb	lb.	lb.	lb.	lb.	lb.	Rs. as	Rs. as	Rs. as.	Rs. as.	Rs as.	Rs. as.
A 1	Mustard cake, 5 maunds per acre, at Re. 1 per 30 seers	593	147	297	67¾	49	202	24	291	1,779	3,598	43 6	9 0	52 6	−3 11	+14 6	+10 11
2	Ditto 10 „ ditto ditto.	410	115	194	67¾	59	169	8	97	1,391	2,347	33 15	5 14	39 13	−10 5	+1 13	−8 8
3	Ditto 20 „ ditto ditto.	492	153	246	67¾	62	161	30	368	1,851	2,977	45 2	7 7	52 9	−23 11	+14 9	−9 2
4	Dung from mustard cake, 50 maunds per acre, at Rs. 4 per hundred.	434	86	195	67¾	44	227	37	447	1,041	1,359	25 6	3 6	28 12	+1 0	−9 4	−8 4
5	Ditto ditto 100 „ ditto.	656	164	307	67¾	53	187	41	496	1,984	3,715	48 6	9 5	57 11	−1 0	+19 11	+18 11
6	Ditto ditto 200 „ ditto.	574	153	297	67¾	52	194	30	363	1,851	3,595	45 2	9 0	54 2	5 0	+16 2	+11 2
7	No manure.	416	123	246	67¾	50	200	+	+	1,428	2,977	36 5	7 7	43 12	+3 0	+5 12	+8 12
B 1	Cotton seed perished, 5 maunds per acre, at Re. 1 per 29 seers.	430	122	184	67¾	36	151	13	157	1,476	2,226	36 0	5 9	41 9	−3 14	+3 9	−0 5
2	Ditto 10 „ ditto ditto.	799	225	348	67¾	65	155	90	1,089	2,722	4,211	66 6	10 8	76 14	−10 13	+38 14	+28 1
3	Ditto 20 „ ditto ditto.	518	164	328	67¾	50	200	29	351	1 984	3,964	48 6	9 15	58 5	−24 9	+20 5	−4 4
4	Dung from cotton seed, 50 maunds per acre, at Rs. 4 per hundred.	332	95	153	67¾	62	161	40	484	1,149	1,851	28 0	4 10	32 10	+1 0	−5 6	−4 6
5	Ditto 100 „ ditto.	410	92	190	67¾	48	207	43	520	1,113	2,299	27 2	5 12	32 14	−1 0	−5 2	−6 2
6	Ditto 200 „ ditto.	492	170	246	67¾	69	145	35	424	2,057	2,977	50 3	7 7	57 10	−5 0	+19 10	+14 10
7	No manure.	492	135	246	67¾	55	182	+	+	1,633	2,977	39 13	7 7	47 4	+3 0	+9 4	+12 4
1	Linseed cake, 5 maunds per acre, at Re. 1 per 21 seers.	443	108·2	188	67¾	55	182	6·14	82	1,247	2,275	30 7	5 11	36 2	−6 8	−1 14	−8 6
2	Ditto 10 „ ditto ditto.	512	148·14	225	67¾	66	151	52 10	636	1,801	2,722	43 15	6 13	50 12	−16 1	+12 12	−3 5
3	Ditto 20 „ ditto ditto.	434	125¼	285	67¾	53	188	29 0	351	1,516	2,843	37 0	7 2	44 2	−35 2	+6 2	−29 0
4	Dung from linseed cake, 50 maunds per acre, at Rs. 4 per hundred.	276	80 14	125	67¾	65	155	15·6	187	978	1,512	23 14	3 12	27 10	+1 0	−10 6	−9 6
5	Ditto ditto 100 „ ditto	493	142¼	225	67¾	63	158	46 0	556	1,721	2,722	42 0	6 13	48 13	−1 0	+10 13	+9 13
6	Ditto ditto 200 „ ditto.	689	164 0	276	67¾	59	168	67 12	819	1,984	3,340	48 4	8 6	56 10	−5 0	+18 10	+13 10
7	No manure.	328	96¼	194	67¾	50	202	+	+	1,165	2,347	28 7	5 14	34 5	+3 0	−3 11	−0 11

1	Til cake, 5 maunds per acre, at Re. 1 per 27 seers.	441	113	164	67¾	69	145	42	508	1,367	1,984	33 5	4 15	38 4	—4 6	+0 4	—4 2
2	Ditto 10 „ ditto ditto.	471	123	205	67¾	60	167	52	629	1,488	2 480	36 5	6 3	42 8	—11 13	+4 8	—7 5
3	Ditto 20 „ ditto ditto.	543	147	225	67¾	65	153	76	920	1,779	2,722	43 6	6 13	50 3	—26 10	+12 3	—14 7
4	Dung from til cake, 50 maunds per acre, at Rs. 4 per hundred maunds.	307	78	102	67¾	76	131	7	85	944	1,234	23 0	3 1	26 1	+1 0	—11 15	—10 15
5	Ditto 100 „ ditto.	463	143	215	67¾	67	150	72	871	1,730	2,601	42 3	6 8	48 11	—1 0	+10 11	+9 11
6	Ditto 200 „ ditto.	430	143	205	67¾	70	143	72	871	1,730	2,480	42 3	6 3	48 6	—5 0	+10 6	+5 6
7	No manure.	406	71	123	67¾	58	173	...	...	859	1,488	20 15	3 11	24 10	+3 0	—13 6	—10 6
1	Safflower cake, 5 maunds per acre, at Re. 1 per 27 seers.	451	151	217	67¾	70	144	37·6	452	1.827	2,626	44 9	6 9	51 2	—4 6	+13 2	+8 12
2	Ditto 10 „ ditto.	488	153	225	67¾	68	147	39 6	476	1,851	2,722	45 2	6 13	51 15	—11 13	+13 15	+2 2
3	Ditto 20 „ ditto.	430	133	213	67¾	62	160	19·6	234	1,609	2 577	39 4	6 7	45 11	—26 10	+7 11	—18 15
4	Dung from safflower cake, 50 maunds per acre, at Rs. 4 per hundred maunds.	451	111½	215	67¾	52	193	2 2	25	1,549	2,601	32 14	6 8	39 6	+1 0	+1 6	+2 6
5	Ditto ditto 100 „ ditto.	461	143	219	67¾	65	153	29·6	355	1.730	2,650	42 3	6 10	48 13	—1 0	+10 13	+9 13
6	Ditto ditto 200 „ ditto.	451	129·10	217	67¾	60	167	16 0	193	1.568	2,626	38 4	6 9	44 13	—5 0	+6 13	+1 13
7	No manure.	400	113 10	201	67¾	56	177	...	...	1,375	2,432	33 9	6 1	39 10	+3 0	+1 10	+4 10
1	Poppy cake, 5 maunds per acre, at Re. 1 per 30 seers.	449	153	221	68	69	144	1	12	1,851	2,674	45 2	6 11	51 13	—3 11	+13 13	+10 2
2	Ditto 10 „ ditto ditto.	533	148½	242	68	61	163	5·8	66	1,797	2,928	43 13	7 5	51 2	—10 5	+13 2	+2 13
3	Ditto 20 „ ditto ditto.	471	147	238	68	62	162	7	84	1,779	2,880	43 6	7 3	50 9	—23 11	+12 9	—11 2
4	Dung from poppy cake, 50 maunds per acre, at Rs. 4 per hundred maunds.	574	176 14	237	68	62	162	22 14	277	2,140	3,472	52 3	8 11	60 14	+1 0	+22 14	+23 14
5	Ditto 100 „ ditto.	348	153	229	68	67	150	1	12	1,851	2,771	45 2	6 15	52 1	—1 0	+14 1	+13 1
6	Ditto 200 „ ditto.	393	131½	235	68	56	179	22·12	275	1,588	2,843	38 12	7 2	45 14	—5 0	+7 14	+2 14
7	No manure.	574	154	235	68	66	153	...	...	1,863	2,843	45 7	7 2	52 9	+3 0	+14 9	+17 9
1	Castor cake, 5 maunds per acre, at 13½ annas per maund.	574	139	235	65½	59	169	11	133	1,682	2,843	41 0	7 2	48 2	—1 3	+10 2	+8 15
2	Ditto 10 „ ditto ditto.	602	144½	229	65½	63	159	16½	196	1,745	2,771	42 9	6 15	49 8	—5 7	+11 8	+6 1
3	Ditto 20 „ ditto ditto.	336	82	170	65½	48	207	46	559	990	2,057	24 2	5 2	29 4	—13 14	—8 12	—22 10
4	Dung from cattle not given any cake, 50 maunds per acre, at Rs. 3 per hundred maunds.	369	108	166	65½	65	154	20	242	1,307	2,009	31 14	5 0	36 14	+1 8	—1 2	+0 6
5	Ditto ditto 100 „ ditto.	473	127	235	65½	54	185	1	12	1,537	2,843	37 8	7 2	44 10	+	+6 10	+6 10
6	Ditto ditto 200 „ ditto.	461	82½	215	65½	38	261	45½	551	998	2,601	24 6	6 8	30 14	—3 0	—7 2	—10 2
7	No manure.	440	128	235	65½	54	184	...	...	1,549	2,843	37 12	7 2	44 14	+3 0	+6 14	+9 14

These plots were made on a land which is naturally rich and had enjoyed dead fallow of one year. The previous crops on it were wheat and oats mostly.

Being a new experiment, it cannot be said how far the natural richness of the soil is to account for the good produce obtained this year. Many of the unmanured plots have given a very good crop indeed. The more the land will get exhausted of its natural fertility, the more correct the result of the experiment will be obtained.

However, from the table it is seen that in the majority of cases five maunds of cake and 100 maunds of cake-fed dung have given the best economical results. In many instances the increase in the quantity of cake and the dung has increased the yield, but the simultaneous increase in the cost of manure has absorbed the profit; although it may be said that the increased cost cannot be considered to have gone into dead loss since its effect will, no doubt, extend to future years.

14. The theory of the English practical farmers, that the best and most economical manure for a farmer is the cake-fed dung, has proved to be true in the instance under review too.

The cost of the dung to a farmer is nothing. He feeds his cattle on cake to give them good nourishment, and he gets good manure by this in the bargain. In every case, instead of using cake as a manure, it will be wise to convert it into dung. The undernoted figures prove the fact. They are the averages of the cost and of the net profit per acre, as shown in foregoing table :—

Cost of—			Rs. a. p.	*Net profit or loss.* Rs. a. p.
Cake, per acre	...	...	+ 39 12 3	— 9 2 0
Cake fed dung, per acre	...	...	+ 4 8 0	+13 8 0
No manure, per acre	...	...	— 3 0 0	+ 6 0 0

15. (*III.*) *Miscellaneous manure experiment.*—(*a*) Of the two new experiments, the second one is to determine for how many years a manure leaves its residue available for succeeding crops.

For this a field was divided into 10 plots and in the year under report they were manured as follows :—

No. of plot.	Area. Square yards.	Manure applied.	Quantity per acre. Maunds.
1	496	Cowdung	300
2	463	*Poudrette*	200
3	502	Cake	300
4	463	Woollen refuse	120
5	496	Cowdung and bone dust	200 and 3 cwts.
6	457	Compost	300
7	450	Green manure	...
8	490	Saltpetre	240lb.
9	445	Ammonic chloride	240lb.
10	532	No manure	...

No manure will be applied for the five succeeding years, and every year a crop of wheat will be sown in it, one year after a bare fallow and next year after an early kharif crop.

The following table shows results of the present season. To draw any conclusion we must, however, wait for future years' results :—

Table No. VI.

		Comparison of outturn with the unmanured plot in the series.								Outturn per acre and its value.				
1	2	3	4	5	6	7	8	9	10	11		12		
Number of plots as per map of the farm.	Detail of special treatment with the rate of its cost.	Weight of unthreshed sheaves.	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Increase or decrease over standard plot in the series.	Increase or decrease per acre.	Actual outturn per acre.		Value of outturn.		
										Grain.	Straw.	Grain @ Rs. 2 per 82 lb.	Straw @ Re. 1 per 100 lb.	Total.
	Quantity of manure applied per acre.	lb.	lb.	lb.	lb			Rs.	Rs.	lb	lb.	Rs. a	Rs. a	Rs. a.
1	Cowdung at Rs. 3 per 100 maunds—per acre, 300 mds.	278	92	170	63¾	54	185	—39	—243	949	1,754	23 2	4 6	27 8
2	*Poudrette* at Rs. 4 per 100 maunds—per acre, 200 maunds.	385	115	172	65¾	67	149	—16	+ 10	1,202	1,798	29 5	4 8	33 13
3	Cake at Rs. 1 per 30 seers—per acre, 300 maunds.	455	84	186	65¾	45	221	—47	—382	810	1,793	19 12	4 8	24 5
4	Woollen refuse at Rs. 2-8 per 100 maunds—per acre, 120 maunds.	397	88½	178	65¾	50	201	—42½	—267	925	1,861	22 9	4 10	27 3
5	Cowdung and bone dust—per acre, 200 maunds.	387	108	190	65¾	57	176	—23	- 138	1,054	1,854	25 11	4 10	30 4
6	Compost per acre, 300 maunds—at Rs. 3 per 100 maunds.	326	92	170	65¾	54	185	—39	—218	974	1,800	23 12	4 8	28 4
7	Green manured with mustard (will be sown with wheat next season).	...	...	...	...	...	...	..	...	...	...	...	...	...
8	Salpetre, per acre 240 lb at Rs. 3-8.	356	98	196	65¾	50	200	—33	—224	968	1,936	23 10	4 13	28 7
9	Ammonic chloride, 240 lb. per acre, at Rs. 15 per 100 lb.	373	83	184	65¾	45	222	—48	—289	905	2,001	22 0	5 0	27 0
10	No manure ...	391	131	182	65¾	72	140	...	...	1,192	1,665	29 1	4 3	33 4

From the foregoing table it will be seen that the result has come out quite extraordinary. Excepting one, no manured plot has given better results than the unmanured. This can only be ascribed to a difference in the conditions of the soil, arising probably from their previous treatments and cropping being somewhat different.

16. *Miscellaneous (b)—Experiment on determination of what constituents of plant-food get exhausted by sowing wheat year after year on the same land.*—It is operated with a series of six plots, thus :—

In one of the plots four manures, in each of which a known substance of plant-food makes an essential part, is applied, and the manures are withheld one by one in the other four plots, while the last is kept unmanured.

The treatment of the plots was as follows :—

(1) Manure, as in the following table.

(2) Ploughings, four.

(3) Waterings, three.

Table No. VII.—Showing manures and outturn.

Comparison of outturn with the standard plot in the series.										Outturn and its value.				
1	2	3	4	5	6	7	8	9	10	11		12		
Number of plots as per map of the farm.	Detail of special treatment with the rate of its costs.	Weight of unthreshed sheaves.	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain	Increase or decrease over standard plot in the series.	Increase or decrease per acre.	Outturn per acre.		Value of outturn.		
										Grain.	Straw.	Grain at Rs. 2 per 82 lb.	Straw at Rs. 1 per 400 lb.	Total.
	Quantity of manure applied per acre.	lb.	lb	lb.	lb.	lb	lb.	lb	Rs	lb.	lb.	Rs. as.	Rs. as.	Rs. as.
1	(1) Calcic superphospate, 180 lb. (2) Ammonic chloride, 138lb. (3) Potassic sulphate, 90lb. (4) Calcic sulphate, 96lb per acre.	221	58½	135	67½	43	231	34½	829	1,416	3,267	34 9	8 3	42 12
2	All but calcic superphosphate.	213	55½	131	67½	42	236	31½	756	1,348	3,170	32 12	7 15	40 11
3	All but ammonic chloride	192	39	141	66½	28	362	14½	357	944	3,412	23 0	8 8	31 8
4	All but potassic sulphate,	170	42½	147	66½	29	346	18½	441	1,028	3,555	25 1	8 14	33 15
5	All but calcic sulphate...	171½	32	137	66	23	428	7½	187	774	3,315	18 14	8 5	27 3
6	No manure. ...	163½	24½	116	62½	21	473	...	...	587	2,807	14 5	7 0	21 5

The present results confirm what were obtained in previous years, *viz.*, "the chief want of the (farm) soil for cereals lies in nitrogen."

The following figures are quoted for comparison from previous years' reports :—

	Outturn of grain per acre.			
	1885-86.	1884-85.	1883-84.	1882-83.
	lbs.	lbs.	lbs.	lbs.
Obtained by application of all manures ...	1,416	1,459	1,777	1,726
Obtained by applying all except ammonic chloride,	944	808	1,002	1,192
Obtained by applying no manure ...	587	757	762	1,045

The importance of nitrogenous manures for wheat has unquestionably been settled now.

17. *Miscellaneous* (c).—This series consists of eight plots of 400 square yards each.

Their treatments and result are shown below :—

(1) Manure, as in the following table.

(2) Ploughing—four times.

(3) Watering—three times.

Table No. VIII.

		Comparison of outturn with the standard plot in the series.								Comparison of cost and income with the ordinary kind of cultivation in vogue in the country.							
1	2	3	4	5	6	7	8	9	10	11		12			13	14	15
Number of plots as per map of the farm	Detail of special treatment with rate of its cost.	Weight of unthreshed sheaves.	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Increase or decrease over standard plot in the series.	Increase or decrease per acre.	Actual Outturn per acre.		Value of outturn.			Increase or decrease per acre in the cost over common cultivation, assumed to be Rs. 80.	Gain or loss per acre in the value of outturn against ordinary kind of cultivation, assumed to be Rs. 38.	Net profit or loss against the assumed income of Rs. 38.
										Grain.	Straw.	Grain at Rs. 2 per 82 lb.	Straw at Rs. 1 per 400 lb.	Total.			
	Quantity of manure applied per acre.	lb	lb.	lb	lb			Rs.	Rs.	lb.	lb.	Rs. as.	Rs. as	Rs. as.	Rs. as.	Rs. as.	Rs. as.
1	Brick kiln refuse, 120 maunds, at Re. 1 per 100 maunds, per acre	291	87	176	66	49	202	17¾	215	1,053	2,130	25 11	5 5	31 0	— 1 13	—7 0	—5 3
2	Silt 300 maunds, at ans. 8 per 100 maunds, per acre ...	283	88	186	66	47	211	18¾	227	1,065	2,251	26 0	5 10	31 10	— 1 8	—6 6	—4 14
3	Compost 300 maunds, at Rs. 3 per 100 maunds, per acre. ...	270	80	164	66	49	205	10¾	130	968	1,984	23 10	4 15	28 9	+ 6 0	—9 7	—15 7
4	Road scrapings, 300 maunds, at Re. 1 per 100 maunds, per acre.	311	80	166	66	48	207	10¾	130	968	2,009	23 10	5 0	28 10	...	—9 6	—9 6
5	Ashes of 120 maunds weeds, at Rs 3 per 100 maunds, per acre.	272	82¾	158	66	52	192	13½	163	1,001	1,912	24 7	4 12	29 3	+ 0 10	—8 13	—9 7
6	Ashes and saltpetre, 240 lb at Rs 3-8 per 82 lb, per acre ...	326	103	180	66	57	174	33¾	400	1,246	2,178	30 6	5 7	35 13	+10 14	—2 3	—13 1
7	Ammonic chloride, 240 lb at Rs. 15 per 82 lb, per acre ...	305	100¾	192	66	52	191	31½	381	1,219	2,323	29 12	5 13	35 9	+40 14	—2 7	—43 5
8	No manure	225	69¼	151	64½	45	218	..	...	838	1,827	20 7	4 9	25 0	+ 3 0	—13 0	—10 0

From the above figures it is seen that anything given in the shape of manure, if it is not very expensive, is better than producing a crop without any manure.

B.

18.—The next class under the permanent experiments, is that of green or vegetable manure (4·45 acres). It consists of five series.

The 1st series, consisting of thirteen plots, is the main one, and the other four are its duplicate. The latter are kept up simply to confirm the results obtained from plots in the main series.

The treatment and the results were as follows:—

Treatment

(1) Manure, as in table IX.

(2) Ploughing—four times.

(3) Watering—three times.

Table No. IX

1	2	3	4	5	6	7	8	9	10	11		12			13	14	15
		Comparison of outturn with the standard plot in the series.								*Comparison of cost and income with the ordinary kind of cultivation in vogue in the country.*							
Number of plots as per map of the farm.	Detail of special treatment with the rate of its cost.	Weight of unthreshed sheaves.	Weight of grain	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Increase or decrease over standard plot in the series.	Increase or decrease per acre	*Actual outturn per acre.* Grain	Straw.	*Value of outturn.* Grain at Re. 1 per 41 lb.	Straw at Re. 1 per 400 lb.	Total.	Gain or loss per acre in the cost against the cost of ordinary cultivation assumed to be Rs. 30.	Gain or loss per acre in the value of outturn against ordinary kind of cultivation assumed to be Rs. 38.	Net profit or loss against the assumed income of Rs. 38.
	Quantity of manure applied per acre	lb.	lb.	lb	lb	lb	lb	lb.	lb	lb.	lb.	Rs. as.	Rs. as	Rs. as.	Rs. as.	Rs. as.	Rs. as.
I.																	
1	Old indigo refuse 120 maunds, at Re. 1 per 100 maunds per acre	518	108½	290	6[illegible]	54	184	— 4½	— 54	1,313	2,420	32 0	6 1	38 1	+ 1 13	+ 0 1	+ 1 14
2	Fresh ditto 120 maunds, at Re. 1 per 100 maunds, per acre,	5 2	114	2[illegible]3	67½	51	185	+ 1	+ 12	1 379	2,698	33 10	6 12	40 6	+ 1 13	+ 2 6	+ 4 3
3	Indigo water 3,600 cubic feet per acre, at Re. 1 per 1,200 cubic feet	779	92	188	66½	49	204	—21	+254	1,1.3	2,275	27 2	5 11	32 13	...	— 5 3	— 5 3
4	Hemp water ditto ditto at Re. 1 per 1,200 cubic feet	439	106	202	67½	53	190	— 7	— 84	1,283	2,444	31 5	6 2	37 7	...	— 0 9	— 0 9
5	No manure	492	113	211	68½	53	187	...	...	1 367	2,553	33 5	6 11	40 0	+ 3 0	+ 2 6	+ 5 0
6	Green-manured with indigo, at Rs. 8 per acre	497	123½	244	68	50	198	+10½	+127	1,494	2,952	36 7	7 6	43 13	— 5 0	+ 5 13	+ 0 13
7	After indigo crop	512	148	264	67½	56	178	+35	+424	1,791	3,194	43 11	8 0	51 11	+ 3 0	+13 11	+16 11
8	Green manured ploughed in as manured with six maunds of gypsum at Re 1-12 per 82 lb, per acre	513	152½	283	68	53	186	+39½	+478	1,845	3,424	45 0	8 9	53 9	—15 8	+15 9	+ 1 6
9	Green hemp ploughed in as manured with six maunds of gypsum at Re 1-12 per 82 lb, per acre	573	89½	169½	67½	53	189	—23½	—284	1,[illegible]53	2,051	26 7	5 2	31 9	— 5 0	— 6 7	—11 7
10	No manure	487	108½	198	67½	55	183	..	...	1,313	2,[illegible]96	32 14	6 0	38 14	+ 3 0	— 0 14	+ 2 2
11	Alternate, with lucerne	576	123	219	67½	56	178	+14½	+175	1,488	2,650	36 5	6 10	42 15	+ 3 0	+ 4 15	+ 7 15
12	After hemp crop	490	84	186	67½	45	221	..		1,116	2,250	27 4	5 10	32 14	+ 3 0	— 5 2	— 2 2
13	Green manured with hemp, at Rs. 3 8 per acre	479	94½	190	68½	50	202	+10½	+122	1,138	2,299	27 12	5 12	33 8	+ 0 8	— 4 8	— 4 0
II																	
1	Fresh indigo refuse 12 maunds and lime six maunds per acre, at Re. 1 per 100 maunds and Rs. 20 per 100 maunds	608	170½	337	67½	50	197	—10	—56 6	968	1,910	23 10	4 12	28 6	+ 0 10	— 9 10	— 9 0
2	Ditto ditto ditto only ..	520	175½	313	68½	53	190	— 5½	—29·7	995	1,887	24 4	4 11	28 15	+ 1 13	— 9 1	— 7 4
3	Old indigo refuse 120 maunds, and lime six maunds, per acre .	712	194	344	68½	56	177	+13½	+75·1	1,019	1,950	26 13	4 14	31 11	+10 0	— 6 5	— 3 11
4	Ditto ditto . ditto only ..	706	181½	313	68½	57	175	+ 1	+ 5·7	1,000	1,802	25 2	4 8	29 10	+ 1 13	—8 6	— 6 9
5	No manure	676	186	352	68	53	189	...	...	1,054	1,995	25 11	5 0	30 11	+ 3 0	— 7 5	— 4 5
6	Ditto	678	175½	327	68½	54	186	...	...	995	1,853	24 4	4 10	28 14	+ 3 0	— 9 2	— 6 2
III.																	
1	Green-manured with hemp	1,756	609½	919	68½	66	151	+	...	836	1,259	23 2	3 2	26 4	+ 0 8	- 11 12	—11 4
2	No manure	968	296½	531	68½	56	179	+	...	986	1,765	24 1	4 7	28 8	+ 3 0	— 9 8	— 6 8
IV.																	
1	Green-manured with hemp...	1,067	252	496	66½	51	197	+26½	+ 51	484	952	11 13	2 6	14 3	+ 0 8	—23 13	—23 5
2	No manure	1,041	225½	505	66½	45	224	+	+	433	969	10 9	2 7	13 0	+ 3 0	—25 0	—22 0
V.																	
1	Ditto	262	80	117	66½	68	146	+	+	968	1,410	23 10	3 9	27 3	+ 3 0	—10 13	+ 7 13
2	Ditto	357	75	157	66½	48	209			907	1,906	22 2	4 12	26 14	+ 3 0	—11 2	— 8 2
3	Alternate with lucerne	584	145½	291	68½	50	200	+68	+826	1,761	3,521	42 15	8 13	51 12	+ 3 0	+13 12	+16 12

As noticed before, plots in series Nos. III and IV were injured by mildew (*girut*); hence it would not be fair to include them for comparison.

From the total in column 7 of the above statement it is seen that in most cases the yield has been good, and by no means inferior to other kinds of fertilizers, *i.e.*, farmyard and artificial manures; but the margin of profit was only in the case of six plots, the other eleven having resulted in loss.

In two cases it is due to the high price of manures applied. But if the price of the crops of indigo and hemp taken from some of the plots and sold be included, the amount of loss will be much diminished.

On the whole, it can fairly be said that indigo and hemp have proved again to be good and economical fertilizers. Sowing wheat after lucerne is just as good as cropping it after indigo.

This year, wheat alternated with lucerne heads the list when net profit is taken into account. In one plot it has given a profit of Rs. 13-8-0 and in the other of Rs. 16-11-0 per acre.

By putting lucerne seed on oats or barley if one can afford giving two or three waterings from April till June, a very good catch-crop of fodder can be obtained, and the field will be left prepared for sowing wheat.

C.

19.—*Determination of the effects of deep and shallow ploughing.*—This experiment is under operation for more than six years, and the plots set aside for this have never received any kind of manure since then.

The natural fertility of the land is getting more and more exhausted every year.

It is obvious that deep ploughing without manure is detrimental to the crop. The exhausted sub-soil coming up on the surface contains nothing to nourish the plant that grows upon it. The following table gives the figures. It shows that the outturn per acre is very poor indeed.

In next season the farmyard manure will be given to each of the plots, and then the result of the deep and shallow ploughing will fairly be compared.

Table No. X.

	Comparison of outturn with the standard plot in the series									*Comparison of cost and income with the ordinary kind of cultivation in vogue in the country.*							
1	2	3	4	5	9	7	8	9	10	11		12			13	14	15
										Actual outturn per acre.		*Value of outturn.*					
Number of plots as per map of the farm	Detail of special treatment with the rate of its cost.	Weight of unthreshed sheaves.	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Increase or decrease over standard plot in the series	Increase or decrease per acre.	Grain.	Straw.	Grain at Rs. 1 per 41 lb.	Straw at Rs. 1 per 400 lb.	Total.	Gain or loss per acre in the cost against the cost of ordinary cultivation, assumed to be Rs. 30.	Gain or loss per acre in the value of outturn against ordinary kind of cultivation, assumed to be Rs. 38.	Net profit or loss against the assumed income of Rs. 38.
	Ploughing.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb	lb.	lb.	Rs. a.	Rs. a.	Rs. a.	Rs. a	Rs. a.	Rs. a.
1	Ploughed 5″ deep (twice) at annas 12 per each ploughing	86	13	65	60¼	20	500	12¾	206	210	1,049	5 2	2 10	7 12	+7 8	—30 4	—22 12
2	Ploughed four times with country plough at annas 12 per each ploughing.	92	17	69	60¼	25	406	+	+	274	1,113	6 11	2 13	9 8	+6 0	—28 8	—22 8
3	Ploughed four times with country plough at annas 12 per each ploughing.	162	34¼	106	60¼	32	312	+	+	557	1,710	13 9	4 4	17 13	+6 0	—20 8	—14
4	Ploughed 9″ deep (twice) at annas 12 per each ploughing.	156	16	73	60¼	22	456	9¾	157	258	1,178	6 5	2 15	9 4	+7 8	—28 12	—21 4
5	Ploughed 9″ deep (twice) at annas 12 per each ploughing.	734	206¼	404	62¼	51	196	26¼	53	413	808	10 1	2 0	12 1	+7 8	—25 15	—18 7
6	Ploughed 9″ deep (twice) at annas 12 per each ploughing.	744	217	337	62¼	56	178	37	71	415	741	10 2	1 14	12 0	+7 8	—26 0	—18 8
7	Ploughed four times with country plough at annas 12 per each ploughing.	760	180	402	62¼	45	223	+	+	335	748	8 3	1 14	10 1	+6 0	—27 15	—21 15

The difference of the value of manure, Rs. 3 per acre, and of ploughing for eight times, at annas 12 each time = Rs 6, is shown in column 13.

The present experiment shows that simple ploughing, whether deep or shallow, is no good. Good farming needs good ploughing, good manuring, good watering and good seed.

D.

20 —**Watering** —As usual, two series of experiments were tried under this head:—

(1).—To ascertain the increase in produce by the increase in the number of waterings.

(2).—To estimate the value of well against canal water.

There have been some winter rains in odd times during the season under report, which has spoilt the purity of the experiment.

However, it seems that the increase of water has somewhat increased the produce too.

But, on the whole, the outturn is much below the plots with manure and only three waterings.

Well water this year has proved in one case better than the canal; but in other cases canal water has given a slight increase.

As stated before, on account of the rain no fair conclusion can be made this year by the experiments.

The following table gives the detail :—

Table No. XI.

		Comparison of outturn with the standard plot in the series								Comparison of the cost and income with the ordinary kind of cultivation in vogue in the country.							
1	2	3	4	5	6	7	8	9	10	11		12			13	14	15
Number of plots as per map of the farm.	Detail of special treatment with the rate of its cost.	Weight of unthreshed sheaves.	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Increase or decrease over standard plot in the series.	Increase or decrease per acre.	Actual outturn per acre.		Value of outturn.			Gain or loss per acre in the cost against the cost of ordinary cultivation, assumed to be Rs. 30.	Gain or loss per acre in the value of outturn against ordinary kind of cultivation, assumed to be Rs. 38.	Net profit or loss against the assumed income Rs. 38.
										Grain.	Straw.	Grain at Rs. 2 per 82 lb.	Straw at Re. 1 per 400 lb.	Total.			
B.A	*Watering.*	lbs.	lbs.	lbs.	lbs	lbs.	lbs.	lbs	lbs.	lbs	lbs.	Rs as.	R. a	Rs. as	Rs. as.	Rs. as.	Rs. as
1	3 times watered from canal at Re 1-4-0 per each watering	431	82½	143	67	58	173	21½	260	998	1,730	24 5	4 5	28 10	+*3 0	—9 6	—6 6
2	3 times watered from well at Re. 1-15-6 per each watering	431	85⅝	86	65	100	100	24⅜	29	1,036	1,041	25 4	2 10	27 14	+2 5	—10 2	—7 13
3	Dry	246	61	82	67	74	13	...	...	738	992	18 0	2 8	20 8	+6 12	—17 8	—10 12
B.a.																	
1	3 times watered from well at Re 1-15 6 per each time	147	33	65	66¾	51	197	—3	—37	399	786	9 12	1 15	11 11	+*2 5	—26 5	—24 0
2	3 times watered from canal at Re 1-4-0 per each watering	153	36	59	66¾	61	163	...	...	436	714	10 10	1 13	12 7	+3 0	—25 9	—22 9
B.B.																	
1	Watered 5 times at Re. 1-4-0 per each watering from canal.	303	80	190	67¾	42	237	27	327	968	2,299	23 10	5 12	29 6	+0 8	—8 10	—8 2
2	Watered 4 times at Re. 1-4-0 per each watering	285	71½	186	67¼	38	262	18¼	224	865	2,251	21 2	5 10	26 12	+1 12	—11 4	—9 8
3	Watered 3 times at Re. 1-4-0 per each watering	291	69½	182	66¼	38	264	16¼	200	841	2,202	20 8	5 8	26 0	+3 0	—12 0	—9 0
4	Watered 2 times at Re. 1-4 0 per each watering	293	69	203	66¼	34	294	16	194	835	2,456	20 6	6 2	26 8	+4 4	—11 8	—7 4
5	Watered 1 time at Re. 1-4-0 per each watering	319	63	229	66½	28	363	10	121	762	2,771	18 9	6 15	25 8	+5 8	—12 8	—7 0
6	Dry	323	53	244	65	22	460	...	...	641	295	15 11	7 6	23 1	+8 4	—14 15	—6 11

The difference of the value of manure, Rs. 3 per acre, and of the labour of three waterings, Rs. 3-12 0, is shown in column 13.

*2.—In well watering extra cost of labour against canal water (as. 11) is included.

E.

21.—*Sowing.*—The experiment of sowing by the Jethro Tull or Lois Weedon system was again tried this year in two places.

The following table shows the result :—

Table No. XII.

Number of plots as per map of the farm.	Manner of sowing.	Area in square yards.		Actual outturn.		Outturn per acre calculated on the total area of the plot.		Outturn per acre calculated on the cropped area alone.	
				Grain.	Straw.	Grain	Straw.	Grain.	Straw.
1	2	3		4	5	6	7	8	9
				℔.	℔.		℔.	℔.	℔.
26*a*	Tull's ...	Under wheat ...	... 828	265	448	672	1,136	1,549	2,619
		Fallow ...	... 1,080						
		Total	... 1,908						
26*b*	Ordinary...		1,980	249	438	609	1,070	...	...
		Duplicate.							
84*a*	Tull's ...	Under wheat ...	... 903	201	287	556	793	1,077	1,538
		Fallow ...	... 848						
		Total	... 1,751						
84*b*	Ordinary...		1,669	328	574	951	1,665	...	...

The above table shows that in one case Tull's system of sowing has given good yield, but in the other case not so good. However, in both cases it shows some advantage over the ordinary kind of sowing. So where manure cannot reach, this system of sowing may advantageously be followed.

Second Class of Experiments.

Temporary or Variable.

22.—During the last season 8·86 acres of land were under these experiments, and the following crops were grown :—

1. Wheat of sorts.
2. Barley.
3. Oats.
4. Leguminous crops.
   (*a*) Gram.
   (*b*) Peas.
5. Linseed.
6. Imported seeds.

Wheat.—Four different kinds of wheat were tried: the following table shows their result :—

Table No. XIII.

	Outturn.							Comparison of cost and income with the ordinary kind of cultivation in vogue in the country.								
1	2	3	4	5	6	7	8	9		10			11	12	13	14
No. of plots as per map of the farm.	Detail of special treatment with the rate of its cost.	Weight of unthreshed sheaves.	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Actual outturn per acre.		Value of outturn.			Gain or loss per acre in the cost against the cost of ordinary cultivation, assumed to be Rs. 30.	Gain or loss per acre in the value of outturn against ordinary kind of cultivation, assumed to be Rs. 38.	Net profit or loss against the assumed income Rs. 38.	Remarks.
								Grain.	Straw.	Grain at Re. 1 per 41 lb.	Straw at Re. 1 per 400 lb.	Total.				
	Quantity of manure applied per acre.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	Rs. as.	Rs. as.	Rs. as.	Rs. as.	Rs. as.	Rs. as	
	No. 1.—Ghajaria wheat.															
42	Cowdung, 300 maunds, at Rs. 3 per 100 maunds.	1170	470	518	66	91	110	1422	1567	34 11	3 14	38 9	— 6 0	+ 0 9	— 5 7	
	No. 2.—Muzaffarnagar soft white wheat.															
10	Cowdung, 200 maunds, at Rs. 3 per 100 maunds, and saltpetre, 112 lb, at Rs. 3-8 per 82 lb.	3190	846	1881	68¼	45	222	1817	4041	44 5	10 2	54 7	— 7 12	+16 7	+ 8 11	Seed was pickled and sown broadcast.
11	Poudrette, 200 maunds, at Rs. 4 per 100 maunds.	2606	626	1626	67¾	38	260	1374	3869	33 8	8 15	42 7	— 5 0	+ 4 7	— 0 9	Ditto ...
	No. 3.—Mundia or beardless wheat.															
35	Sheep folded a week at Rs. 1-8 per acre ...	3654	1189	1077	62	110	91	1616	1463	39 7	3 10	43 1	+ 1 8	+ 5 1	+ 6 9	
	No. 4.—Kathia.															
38A.	Poudrette, 200 maunds, at Rs. 4 per 100 maunds.	518	67	209	57	32	312	378	1180	9 3	2 15	12 2	— 5 0	—25 14	—30 14	

No. 1.—Gujaria. This variety was sown under Government Order No. $\frac{1649}{A-85}$, dated 22nd September, 1885, and the quantity cropped has already been despatched to the India Office. Only 1 maund and 15 seers of seed was received from the Superintendent, Botanical Garden, Saháranpur. It came rather late in the season, but with due care a fair crop was obtained. It gave a very good yield of grain, the percentage over straw being 91.

No. 2.—Muzaffarnagar white wheat. The sowing of this variety was connected with an experiment tried for the first time at the station. The seed before sowing was pickled in a solution of copper sulphate. This process of pickling is almost universal in England, but in this country it is quite unknown One of the two fields in which this experiment was conducted was also top-dressed with saltpetre, after the English fashion of sowing wheat. The result seems to be very successful. The top-dressed plot produced a crop worth Rs. 54-7-0 per acre, while the other which was not top-dressed with saltpetre yielded a crop worth Rs. 42-7-0 only. In the first case there was a clear profit of Rs. 16-11-0 over and in excess of what is obtained from the ordinary method followed by the cultivators.

No. 3.—Beardless. It was sown after the fashion in vogue in the country, to serve as a standard for comparison of the results of all experiments in money value. Though the field was to some extent affected by smut, yet the outturn was, on the whole, very good.

No. 4.—Kathya. This variety is a especial produce of the *mar* land of Bundelkhand The result shows no success, and it may be assumed that no other soil but *mar* is suited to it.

Barley.

23. The following varieties were tried, their results are shown in the table below :—

1. Rasuli (unhusked).
2. Chocolate.
3. Ordinary country variety of the Doab.

Table No. XIV—Barley.

1	2	3	4	5	6	7	8	9	10	11		12			13	14	15
	Outturn.									*Comparison of cost and income with the ordinary kind of cultivation in vogue in the country.*							
										Actual outturn per acre.		*Value of outturn.*					
Number of plots as per map of the farm.	Detail of special treatment with the rate of its cost.	Weight of unthreshed sheaves.	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Increase or decrease over standard plot in the series.	Increase or decrease per acre.	Grain.	Straw.	Grain at Re. 1-8 per 82 ℔.	Straw at Re 1 per 492 ℔.	Total.	Gain or loss per acre in the cost against the cost of ordinary cultivation, assumed to be Rs 30.	Gain or loss per acre in the value of outturn against cultivation of wheat, assumed to be Rs 38.	Net profit or loss against the income from cultivation of wheat assumed to be Rs. 38.
	Quantity of manure applied per acre.	℔.	℔.	℔.	℔.			℔.	℔	℔.	℔.	Rs as.	Rs. as.	Rs as.	Rs. as.	Rs as.	Rs. as.
							No. 1—Chocolate colour variety.										
306	No manure, 2 waterings at Rs. 2-12 each,	202	47	94	64½	50	200	...	...	1109	2209	18 2	4 8	22 10	+5 12	—15 6	—9 10
							No. 2—Unhusked or naked variety.										
...	Ditto ditto ...	157	12	78	64½	15	650	...	...	538	3496	8 13	7 2	15 15	+5 12	—22 1	—16 5
							No. 3—Country barley.										
15	No manure, 2 waterings at Rs. 2-12 each,	1398	526	768	53¼	69	146	...	...	1697	2478	27 13	5 1	32 14	+5 12	—5 2	+0 10
16A	Lucerne ploughed in at Rs. 3-4 per acre and 2 waterings at Rs. 2-12 each.	296	106	84	53¼	126	79	...	...	2094	1659	34 5	3 6	37 11	—2 12	—0 5	—2 7
							No. 4—Country barley.										
P.	Poudrette, 120 maunds per acre, at Rs 4 per 100 maunds, and 2 waterings at Rs. 2-12 each.	1430	678	567	53 3	119	83	...	103	1172	980	19 3	1 15	21 2	+0 15	—16 14	—15 15
...	No manure, 2 waterings at Rs. 2-12 each,	3924	1561	882	53·8	177	56	...	...	1349	762	22 2	1 9	23 11	+5 12	—14 5	—8 9

NOTE—The assumed figures are—

(1) Value of outturn of an acre of barley—

	Rs.
(a) Grain, 16 maunds @ Re. 1-8 per maund	=24
(b) Straw, 24 ditto @ 6 maunds per Re.	=4
Total ...	28

(2) Assumed cost of cultivation per acre is Rs 20.

(3) The difference of the actual cost of the different experiments on barley and of the assumed cost of wheat (Rs. 38) is entered in column 13.

(4) The figures in column 15 show the loss or gain against or above the income from an acre of wheat (Rs. 38).

Nos. 1 and 2 were under Government orders procured from Sahâranpur. The seed received was, however, very small in quantity and so the crop raised was not much. Their produce is carefully preserved for next season.

Country barley.—The field in which it was sown after lucerne gave very good yield. This again confirms that, like clover in England, lucerne in India prepares the land for cereals. *Poudrette* here too, as in the case of wheat, produced no effect, but this looks extraordinary.

24.—*Oats.*—The cultivation of Cape oats was repeated. The following table shows its results :—

Table No. XV (Cape oats).

		Outturn.						Comparison of cost and income with the ordinary kind of cultivation in vogue in the country.							
1	2	3	4	5	6	7	8	9		10			11	12	13
Number of plots as per map of the Farm.	Manure	Weight of unthreshed sheaves	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Actual outturn per acre.		Value of outturn.			Increase or decrease per acre in cost against the cost of ordinary cultivation of wheat.	Gain or loss per acre in the value of outturn against wheat cultivated in the ordinary way.	Net profit or loss compared with the profit from wheat cultivated in the ordinary way
								Grain.	Straw.	Grain at Rs. 1 8 per 82 lb.	Straw at Rs 1 per 492 lb	Total.			
	Quantity of manure applied per acre.	lb	lb	lb	lb.			lb	lb.	Rs. as	Rs as.	Rs as.	Rs. as.	Rs. as.	Rs. as.
29b	100 maunds woollen refuse at Rs 2-8 0 per 100 maunds, 75 maunds poudrette at Rs 4 per 100 maunds and 25 maunds lime at Rs. 20 per 100 maunds.	1800	396	999	40½	40	252	2,323	5,861	42 8	17 14	60 6	+7 8	+22 6	+14 14
20	Cowdung, 200 maunds, at Rs. 3 per 100 maunds.	1083	394	792	40½	50	201	1,834	3,686	33 9	11 4	44 13	+3 0	+6 13	+3 13
16B, c	Lucerne ploughed in at Rs 8 4 0 per acre...	398	112	142	41	79	127	1,306	1,656	23 14	5 1	28 15	+5 4	−9 1	−14 5
19	Cowdung 200 maunds at Rs. 3 per 100 maunds.	784	205	639	40½	32	312	1,012	3,156	18 8	9 10	28 2	+3 0	−9 14	−12 14
	Total ...	4,065	1,107	2,572	162½	201	892	6,465	14,359	118 7	43 13	162 4	+18 12	+10 4	−8 8
	Average ...	1,016	277	643	41	50	223	1,619	3,590	29 10	10 15	40 9	+4 11	+2 9	−2 2

The above figures prove that growing oats is very profitable. With woollen refuse it gave an outturn worth Rs. 60 per acre, far in excess of any crop, even wheat. In one of the two fields to which it was applied, cowdung too gave good results.

Lucerne ploughed in as a green manure has not shown any excess here.

Leguminous Crops.

26.—As a rule, gram in this country is grown without any manure or watering, and even with no good tilth. The cost of sowing gram is the least of all grains, being only about Rs. 15, and its outturn is usually worth about Rs. 20. The figures in the following table show that by good culture and good treatment the outturn, and thereby the net profit, can be considerably increased. Similar remarks are applicable in the case of peas also. The following table gives the result:—

Table No. XVI.

		Outturn.						Comparison of cost and income with the ordinary kind of cultivation in vogue in the country							
1	2	3	4	5	6	7	8	9		10			11	12	13
								Actual outturn per acre.		Value of outturn.					
Number of plots as per map of the farm.	Detail of special treatment with the rate of its cost.	Weight of unthreshed sheaves.	Weight of grain.	Weight of straw.	Weight of grain per bushel.	Percentage of grain on straw.	Percentage of straw on grain.	Grain.	Straw.	Grain at Rs. 1-8 per 82 lb.	Straw at Rs. 1 per 492 lb.	Total.	Increase or decrease per acre in cost against the cost of ordinary cultivation.	Gain or loss per acre in the value of outturn against ordinary cultivation of wheat.	Net profit or loss against the assumed income, by cultivation of wheat Rs 33.
	Quantity of manure applied per acre.	lb.	lb.	lb.	lb.	lb.	lb	lb.	lb.	Rs a.	Rs. a.	Rs. a.	Rs. a.	Rs. a.	Rs. a
							Gram.								
25	Sheep dung 200 maunds at Rs. 3 per 100 maunds and one watering at Rs. 2-12-0 = 8-12-0.	1,246	678	516	62	131	71	2,061	1,568	36 2	6 2	42 4	+2 8	+4 4	+6 12
2	Saltpetre 1 cwt. at Rs 3-8-0 per 82 lb and one watering at Rs 2-12-0 = 7-8-0.	518	205	313	62	65	153	1,287	1,965	22 9	7 11	30 4	+3 12	—7 12	—4 0
1	No manure, one watering at Rs 2-12 0	155	30	86	62	35	287	540	1,547	9 7	6 1	*15 8	+8 7	—22 8	—14 0
9	Lona 4 cwt. at As. 8-0 per 82 lb—2-2-0 and one watering at Rs. 2-12-0 = 5-8-0.	324	92	160	62	57	174	721	1,253	12 10	4 14	17 8	+5 8	—20 8	—14 12
	Total ...	2,243	1,005	1,075	248	288	690	4,609	6,333	80 12	24 12	105 8	+20 8	—46 8	—26 0
	Average ...	561	251	269	62	72	172½	1,152	1,583	20 3	6 3	26 6	+5 2	—11 10	—6 8
							Peas								
20a	Mixture of cowdung, sheep dung, poudrette 300 maunds, at a total cost of Rs. 10 and one watering at Rs. 2-12-0.	1,728	573	1,010	62	56	176	2,311	4,074	36 15	15 14	52 13	—1 8	—14 13	+13 5
24	Poudrette 200 maunds at Rs. 4-0-0 per 100 maunds and one watering at Rs. 2-12-0.	1,554	395	623	62	63	158	743	1,172	11 14	4 9	16 7	+0 8	—21 9	—21 1
	Total ...	3,282	968	1,633	124	119	334	3,054	5,246	48 13	20 7	69 4	—1 0	—6 12	—7 12
	Average ...	1,641	484	816	62	59	167	1,527	2,623	24 6	10 3	34 10	—0 8	—3 6	—3 14

* Suffered from waterlogging in the fields.